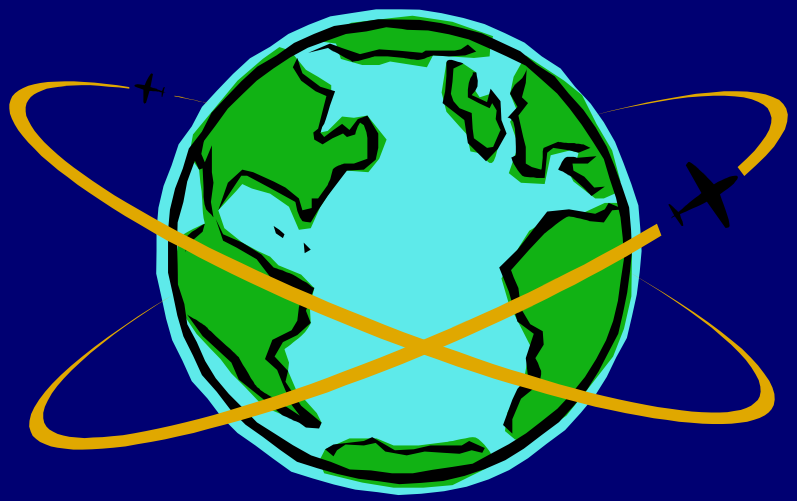
Globalization: Travel, Human Migration and Public Health Risks



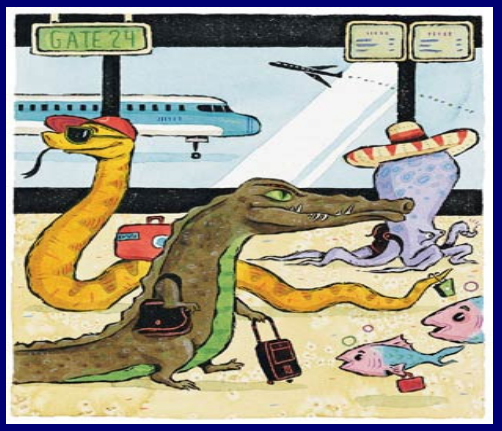
Nina Marano, DVM MPH Dipl ACVPM
Division of Global Migration & Quarantine
Centers for Disease Control and Prevention

Outline

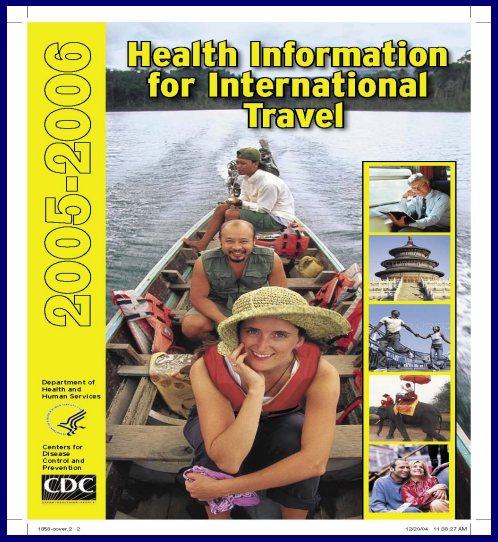
- Travel trends
- Traveling populations
- Travel health risks
- Travelers as sentinels
- CDC's Travel Notices
- Immigrant & Refugee Health

A World in Motion

International Passenger Arrivals = 49,401,528



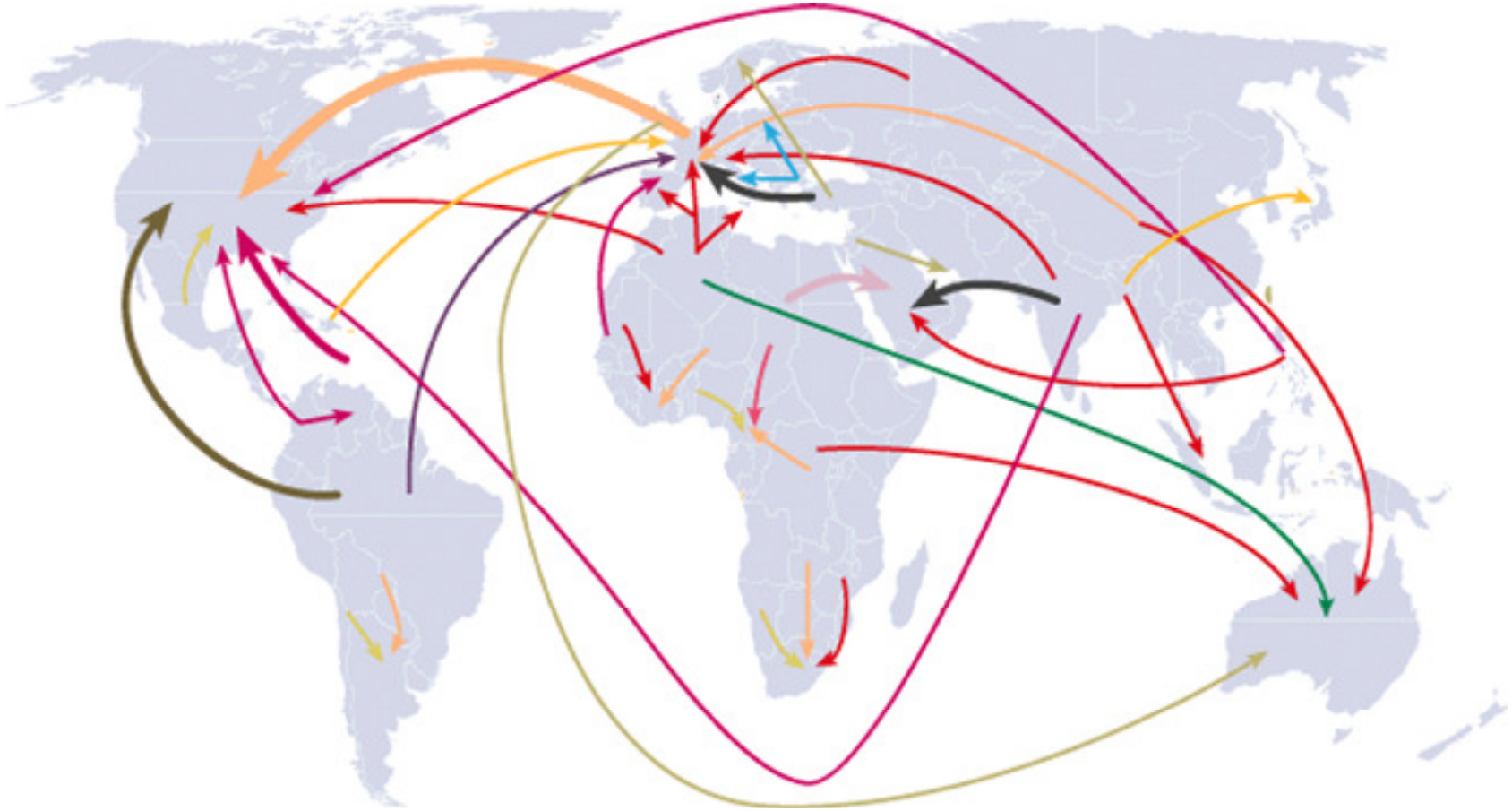
Wild Mammals Imported = 88,000 (Photo Delta Sky Mag.)



Traveler Visits Abroad ≥ 1 night =63,502

Immigrant and Refugee Arrivals = 437,864

Migrating Populations, 1960-1975



Source: Population Action International 1994

Migrating Populations in the 1990s

4 x increase in volume as compared to 1960-75

Source: Population Action International 1994

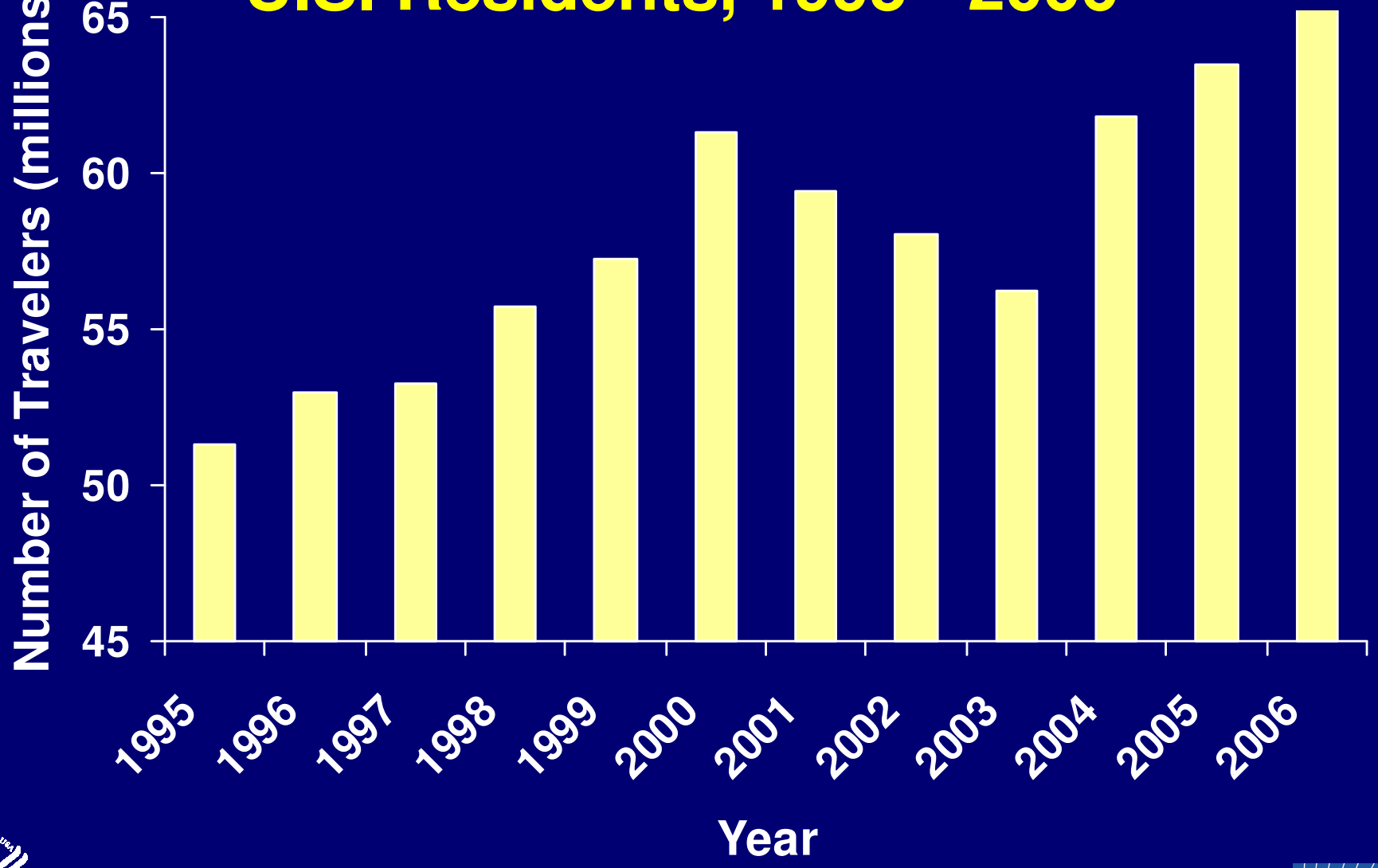
A Day in the Life of the Travelers' Health Team

- Dengue in Argentina
- Chikungunya fever in Italy
- Hepatitis A in Ethiopian adoptees
- Schistomsomiasis in Tanzania
- Rabies imported from Thailand and India
- Zika virus in Yap
- Norovirus in Dominican Republic
- Malaria in the Bahamas

Estimated Annual International Arrivals, U.S.A. 2006

OIS, Dept. Homeland Security, Fiscal Year 2006
ITA, Dept. of Commerce, Calendar Year 2006

Number of Visits Abroad of ≥1 night by U.S. Residents, 1995 - 2006



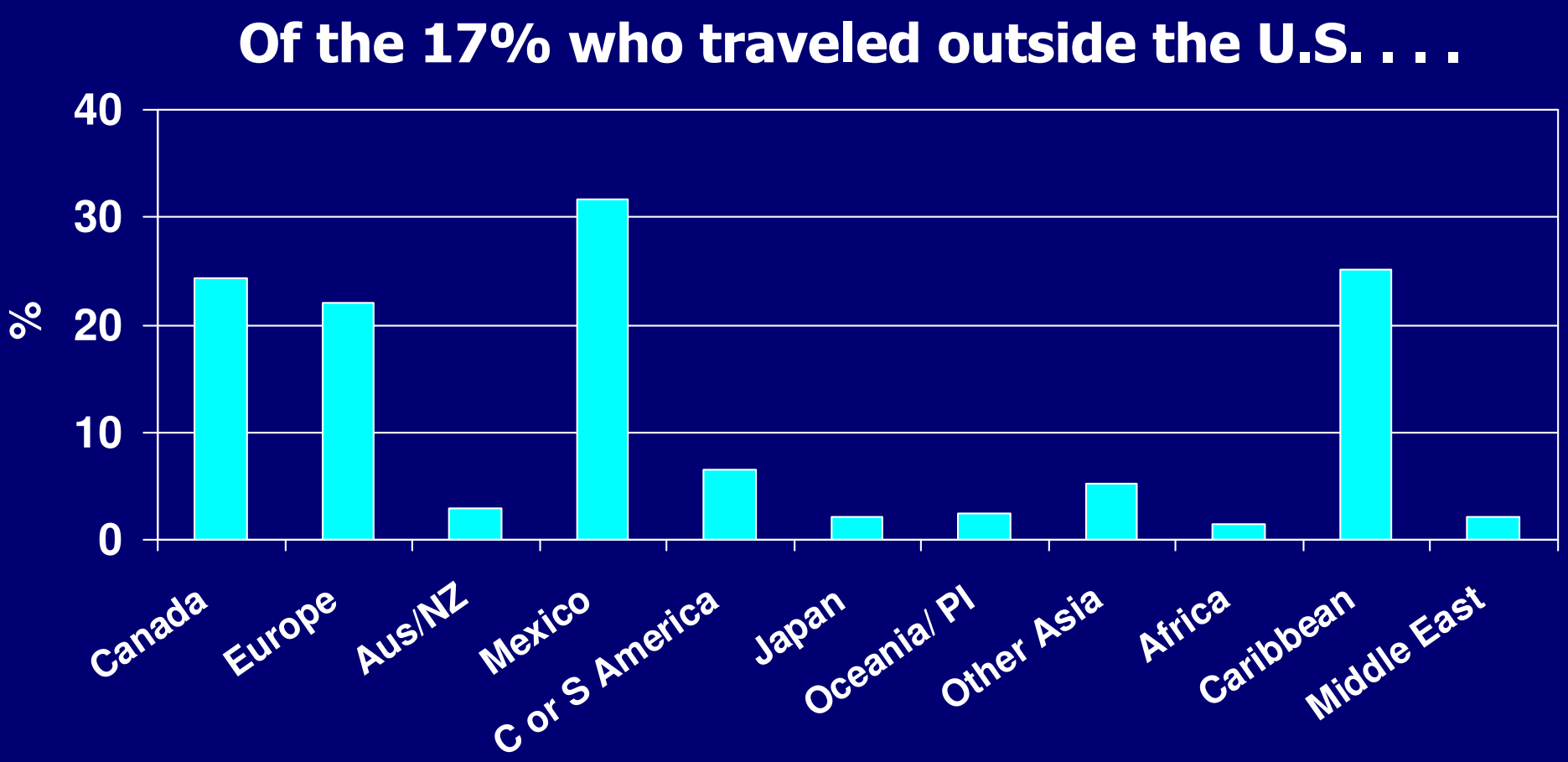
*ITA, includes travel to Canada and Mexico

What proportion of the US adult population traveled outside the US for more than a day during the previous year?

17%

The US traveling population and use of the CDC Travelers Health website
Weld L., Reed C., Steele S., et al 9th CISTM, Portugal, 2005

Where Do U.S. Residents Travel?



Source: HealthStyles Survey 2006

VFRs: Visiting Friends and Relatives

- Foreign-born increased 57% since 1990 from 19.8 million to 31.1 million[1]
- 20% of US population are first-generation immigrants or their children[2]
- VFRs comprised ~43% of US overseas travelers in 2006[3]

[1]US Census Bureau, Census 2000 Brief, The Foreign-Born Population: 2000, issued Dec 2003 (Previous: US Census Bureau, Profile of the Born Outside the United States Population 2000, issues Dec 2003

[2] Angell & Cetron, 2005

[3]2006 Profile of U. S. Resident Travelers Visiting Overseas Destinations Reported From: Survey of International Air Travelers, Office of travel and tourism Industries, USDOC

VFRs: Visiting Friends and Relatives

- Increased risk of travel-related infections
  - Malaria
  - Typhoid fever
  - Hepatitis A
  - Tuberculosis
- Unlikely to seek pre-travel health advice
- Limited access to care (e.g., uninsured)
- Lower perceived risk
- Primary-care clinicians unaware of risk

Angell. Ann Intern Med. 2005; 42:67.

U.S. Study-Abroad Students

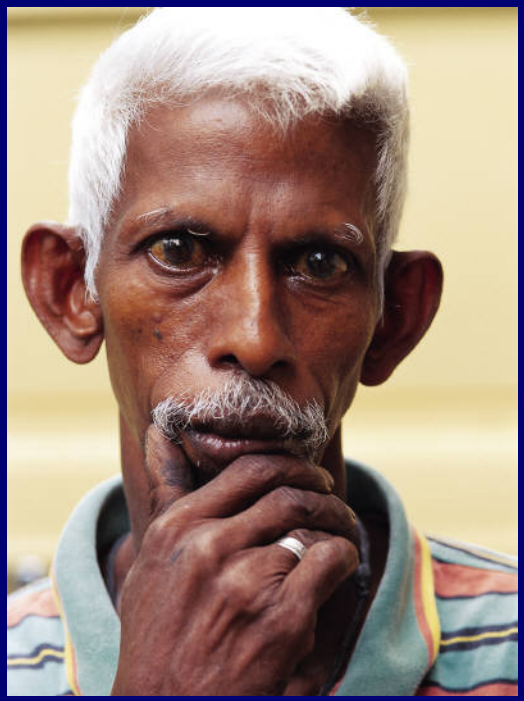
Leading Destinations 2005-2006, (N=223,534)

United Kingdom	Japan
Italy	Austria
Spain	New Zealand
France	Czech Republic
Australia	Greece
Mexico	Chile
Germany	South Africa
China	Argentina
Ireland	Brazil
Costa Rica	India

Open Doors (Institute of International Education)

Seniors

- 9% of U.S. adults traveling abroad were ≥ 65 years
  ~3 million
- 25% were age ≥ 55 years
  ~8 million



ITA, 2004

Immunocompromised Travelers

- HIV
- Active leukemia/lymphoma
- Generalized malignancy
- Aplastic anemia
- Solid organ transplant
- Bone Marrow Transplant (BMT) within 2 years
- Transplant on immunosuppressive medication
- Congenital immunodeficiency
- Radiation Therapy

Travelers' Health Risks

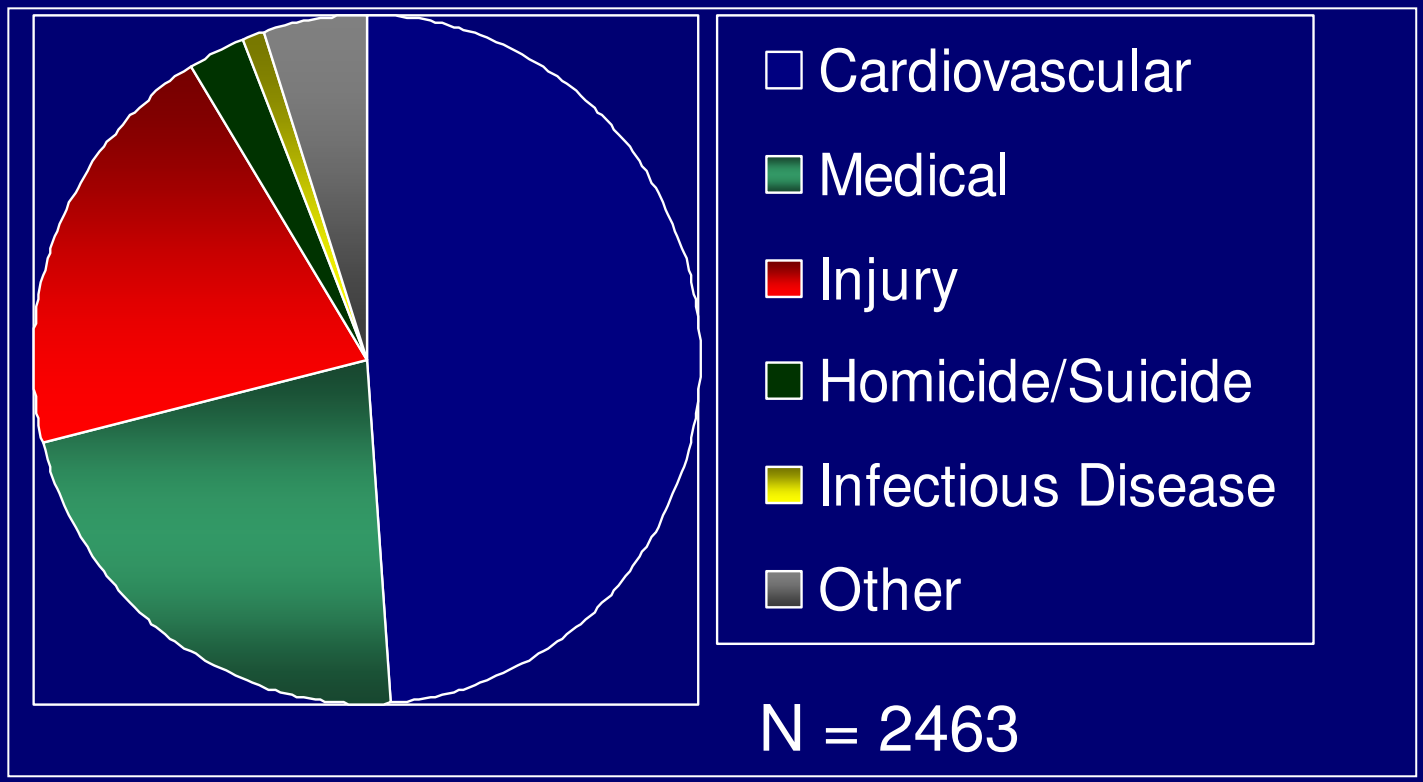
Of 100,000 travelers to a developing country for 1 month:

- **50,000 will develop some health problem**
- **8,000 will see a physician**
- **5,000 will be confined to bed**
- **1,100 will be incapacitated in their work**
- **300 will be admitted to hospital**
- **50 will be air evacuated**
- **1 will die**

Steffen R et al. J Infect Dis 1987; 156:84-91

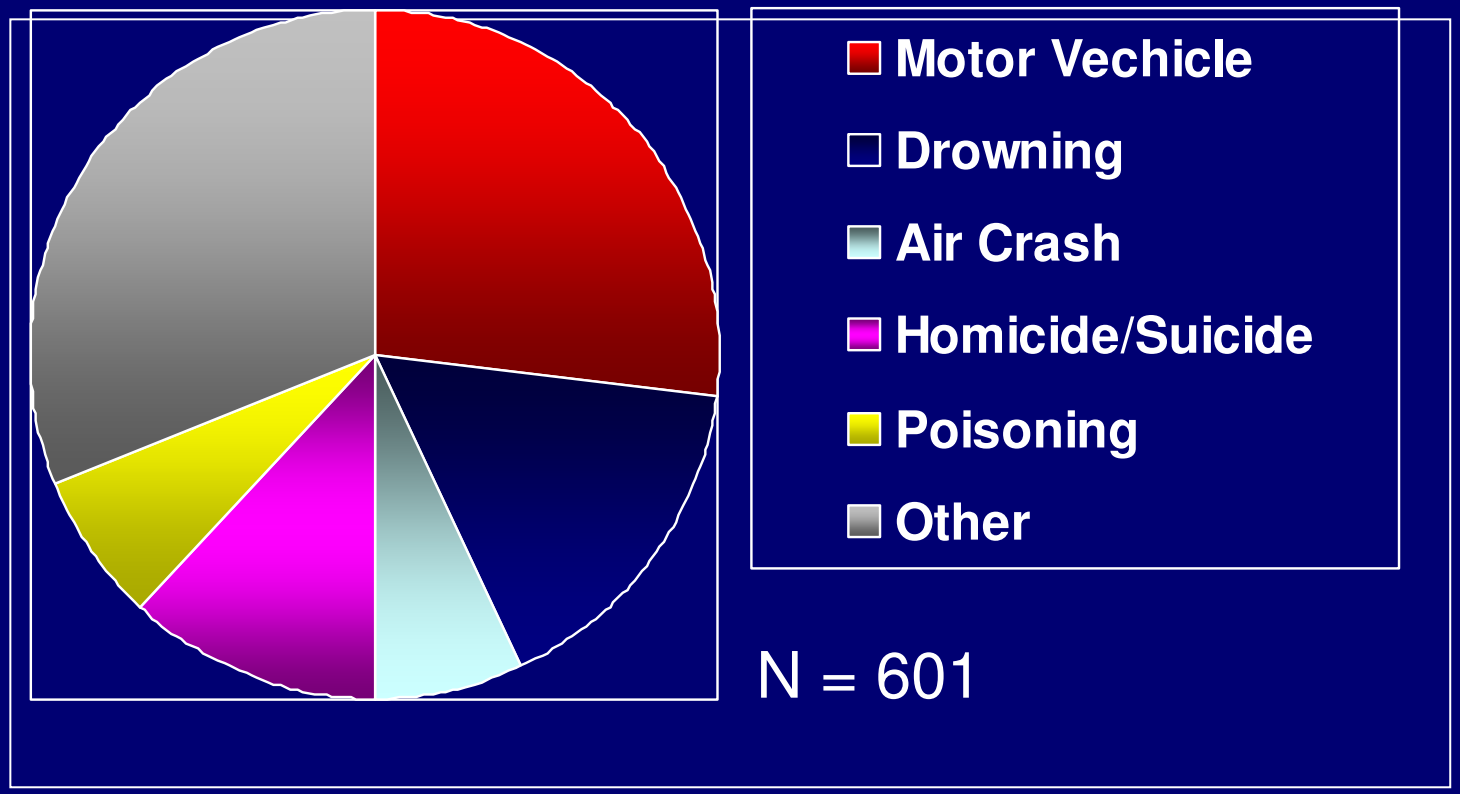
CDC

Deaths Related to International Travel



Hargarten S et al, Ann Emerg Med, 1991. 20:622-626

Injury Deaths and International Travel



Hargarten S et al, Ann Emerg Med, 1991. 20:622-626

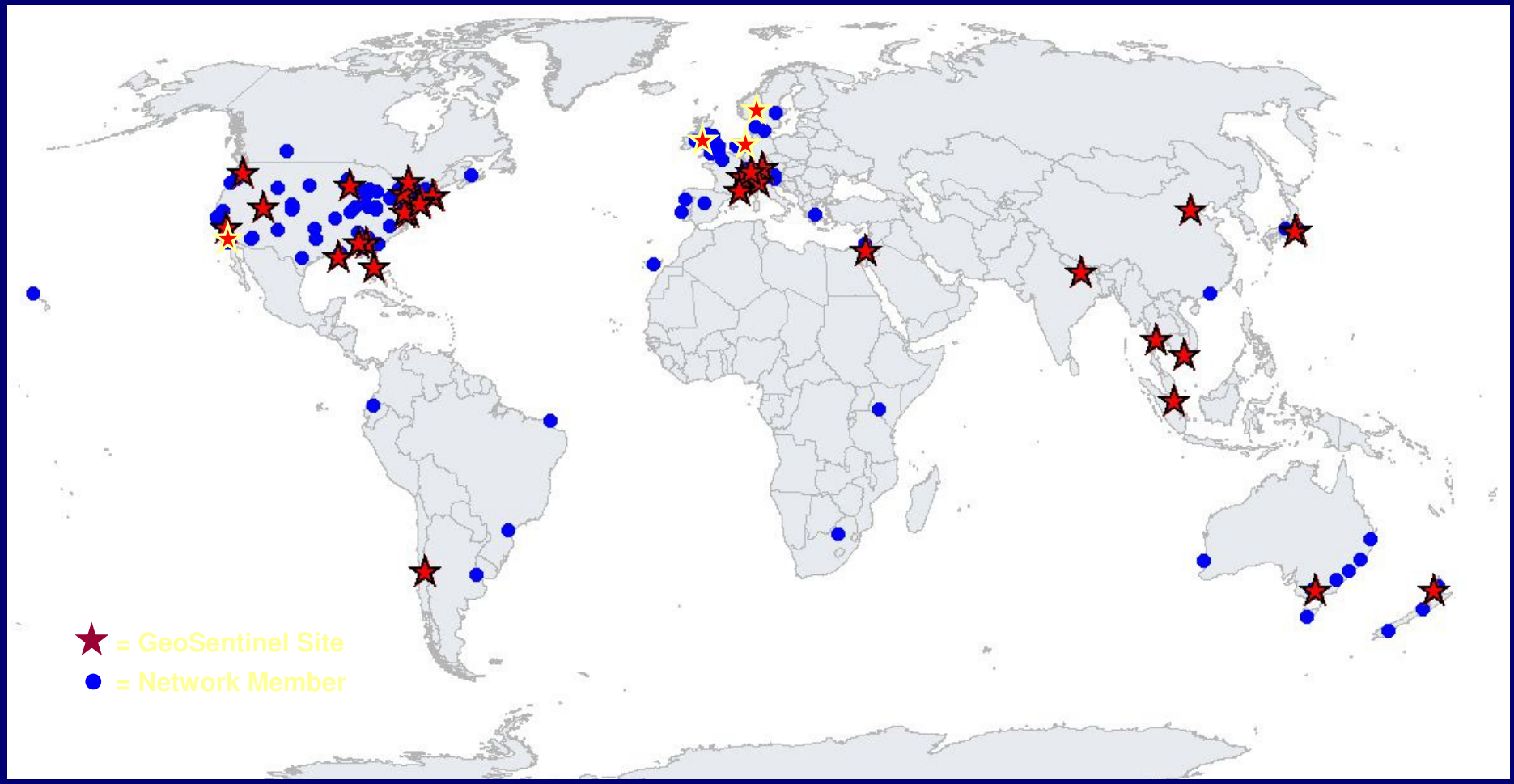
Infectious Disease Risks to the Traveler

- Malaria
- Diarrhea
- Leishmaniasis
- Rabies
- Dengue
- Meningococcal Meningitis
- Schistosomiasis
- Tuberculosis
- Leptospirosis
- Polio
- Yellow Fever
- Measles
- JEV

Medical Tourism

http://www.cbc.ca/news/

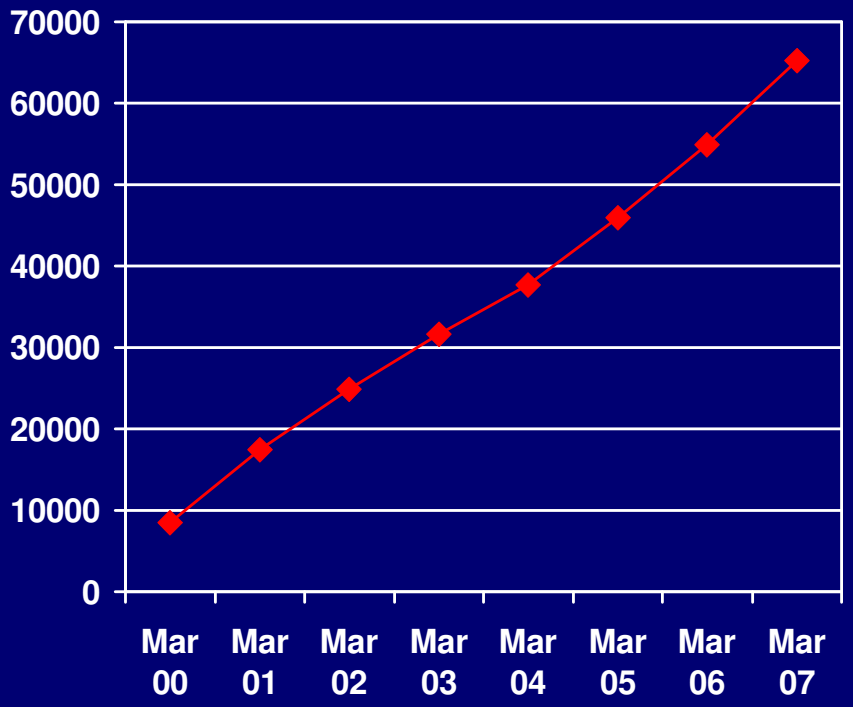
GeoSentinel Surveillance



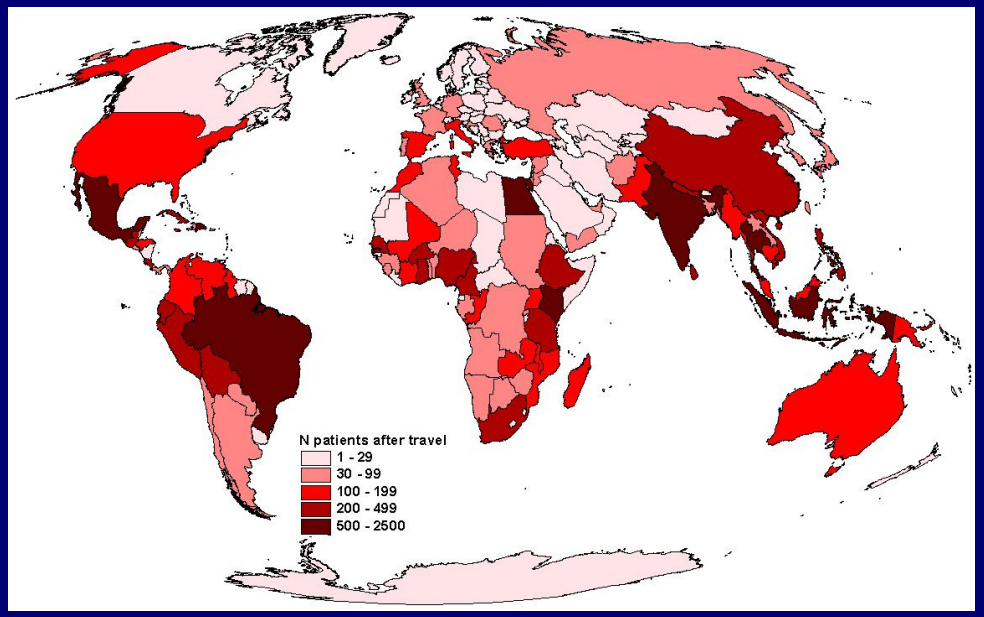
- Provider-based Surveillance of international travelers and migrants.
  Does not cover endemic diseases in local populations
  - ★ 39 travel/tropical medicine clinics globally (since 1996)
  - ○ 145 Network Members on all 6 continents (since 2002)

GeoSentinel Dataset, March 2007

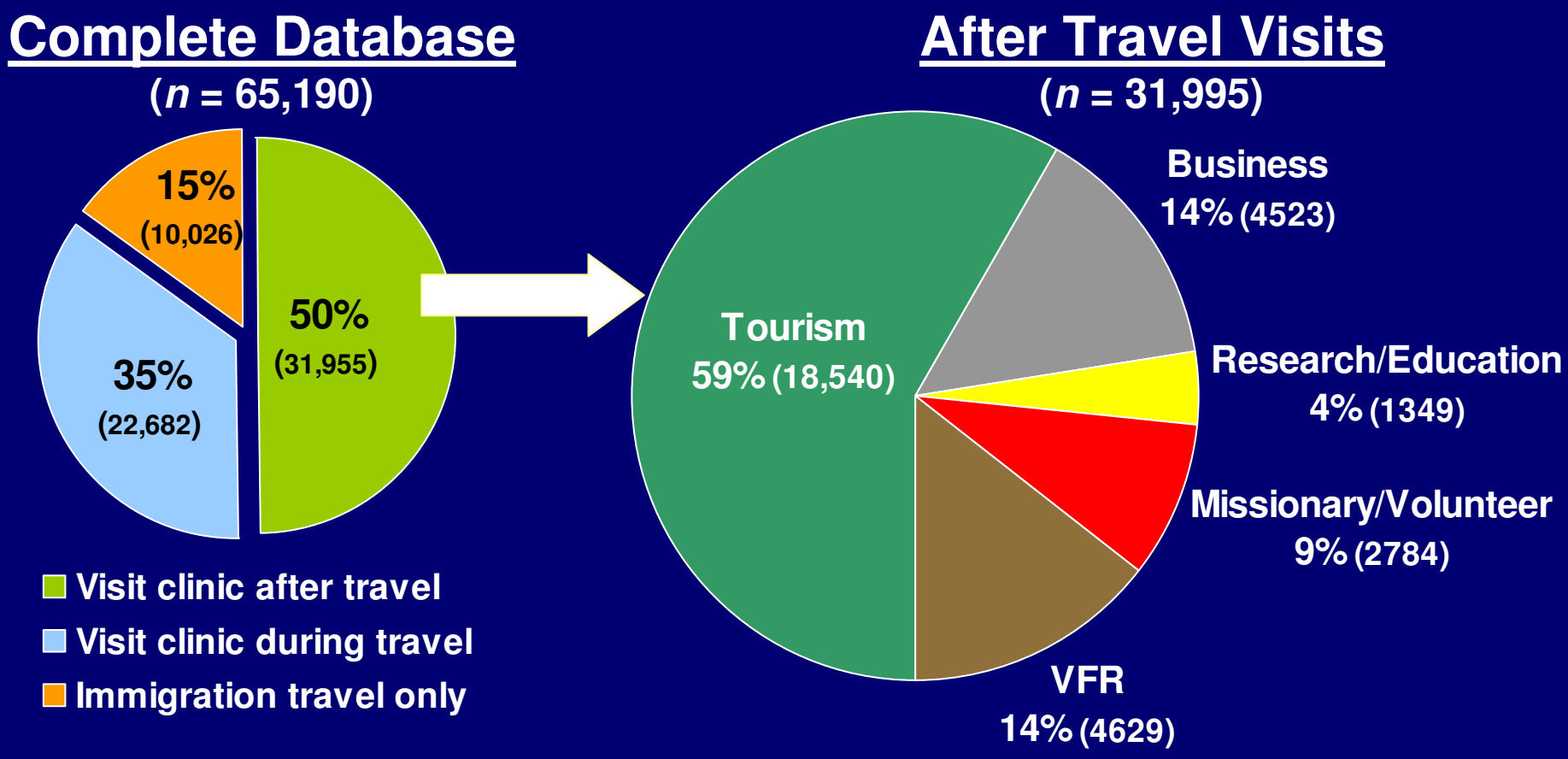
Number of Patients in GeoSentinel (*n* = 65,190)



Place of Likely Exposure in Patients Seen After Travel



Who are GeoSentinel patients?
(as of March 2007)



GeoSentinel: How Are the Data Used?

- Detect alarming events
  - new or emerging disease
- Monitor disease trends
- Identify risk groups
- Identify new risk areas
- Conduct epidemiologic research

Initial Events During SARS

Severe Acute Respiratory Syndrome (SARS)
March 14 - Urgent Alert

Dear GeoSentinel Sites:

Please see below this important alert from CDC and WHO who are both aggressively following these outbreaks of an apparently highly communicable atypical pneumonia and investigating any possible links

Alert: Asia Highly Communicable Respiratory Disease

Insert Signature

Dear GeoSentinel Network Members:

Please see below this important alert from CDC and WHO who are both aggressively following these outbreaks of an apparently highly communicable atypical pneumonia and investigating any possible links between cases in China, Hong Kong and Hanoi. We request all GeoSentinel sites to be on the alert for cases of atypical pneumonia in travelers recently returned from China, Hong Kong SAR, or Vietnam. Your appropriate natinal public health authorities should be notified. Geosentinel is working closely with CDC on this and would appreciate e-mail advisement of any suspicious cases. Please keep this restricted to the GeoSentinel network for now.

David

==========

Subject: FW: CDC Update 00117 - WHO issues a global alert about cases of atypical pneumonia

This is an official
CDC Health Update

Distributed via Health Alert Network
March 12, 2003, 23:15 EDT (23:15 PM EDT)
CDCHAN-00117-03-03-12-UPD-N

The Signal from Toronto
Global, not just Asian Implications

RE: respiratory deaths in travellers to Hong Kong - Toronto URGEN

Hi Guys:
A quick heads up - we have just had 2 deaths (one in their 30s and one in their 60s) and 3 secondary cases (2 now in ICU) from an acute respiratory disease in recent travellers to Hong Kong. Early diagnostic tests for influenza A and B and other respiratory viruses are NEG. Anyone else having similar cases??
Kevin

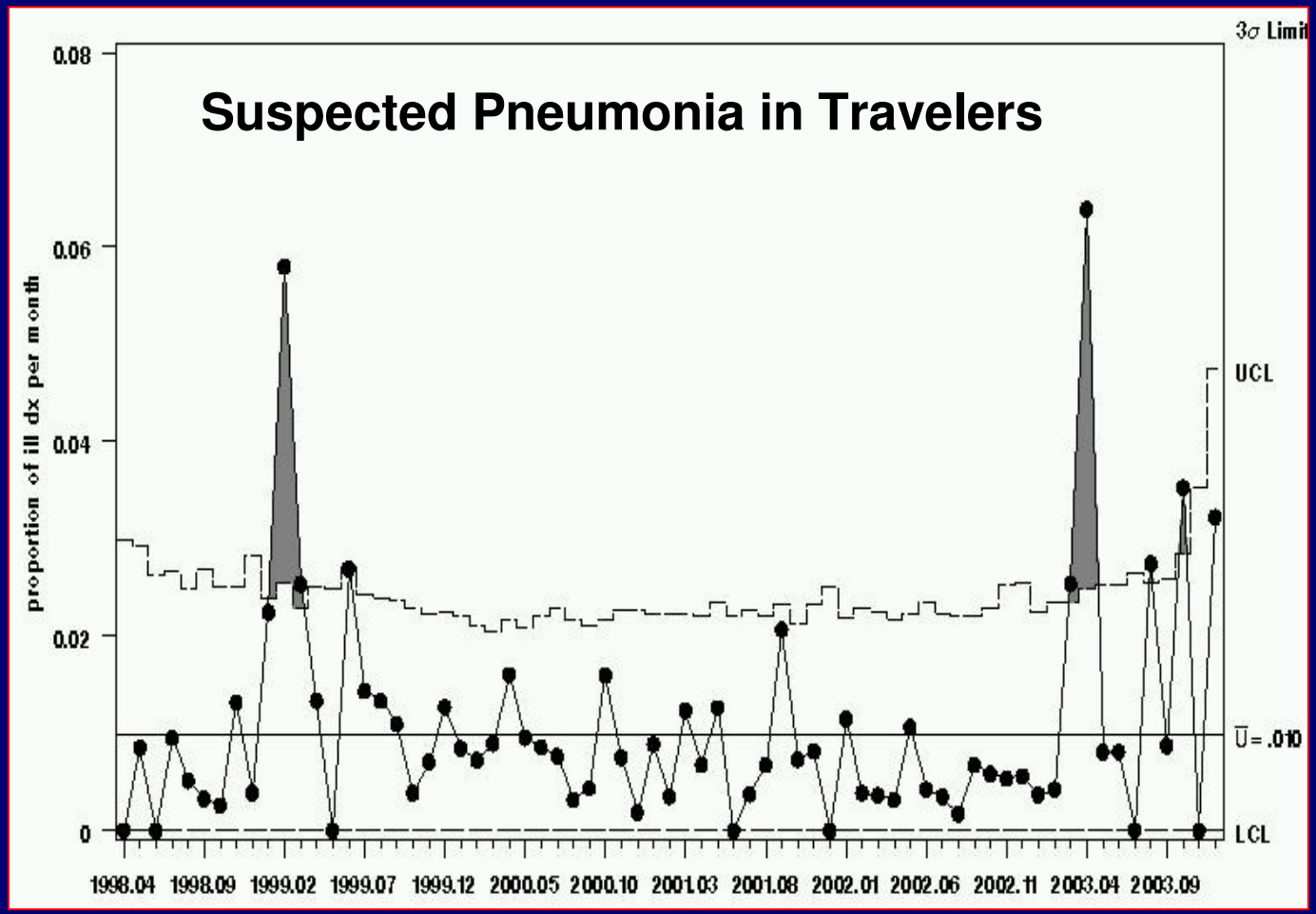
Kevin C. Kain MD FRCPC
Professor of Medicine
University of Toronto

Severe Acute Respiratory Syndrome (SARS)
March 14 - originally released to site directors only

Dear Site Directors:

Six hours ago Kevin Kain at the Toronto GeoSentinel site sumbitted the shocking report shown below. An autopsy has been completed in the past few hours. The implications of this on a global basis are staggering in light of the apparent high contagiousness of the pathogen as reported from the outbreaks ongoing in Asia. The GeoSentinel link with CDC has allowed tissue to be routed directly to appropriate places in Atlanta. This will likely hit the news tomorrow in Canada but we wanted to give GeoS a heads up in front of the storm that is surely to follow. Because of sensitivities this news acquired directly through GeoS is not being routed with the CDC imprimatur and please keep this highly confidential until it hits the usual sources. In a few minutes I will follow with some updates as per the official CDC contact points. Privately we have been told of suspect cases in at least 3 other countries in Asia and possibly one in the US. Please

Rapid Institution of Enhanced Surveillance
example: weekly trend analysis during SARS



Leptospirosis-EcoChallenge, 2000

- September 11, 2000; London site Queries by e-mail concerning ill returnees from Eco-Challenge, Sabah 2000
- Query-Response to GeoS sites: Cases from NYC and Toronto. Elapsed time=8 hours.
- Participants worldwide still within incubation period. Wide broadcast of GeoSentinel Alert to to ISTM, ProMed, IDSA, TropMed. Elapsed time=14 hours.
- GeoSentinel sites interface directly with public health authorities in USA, UK, Australia and Canada to contact all at risk individuals. Elapsed time=48 hours.

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

January 19, 2001 / Vol. 50 / No. 2

MMWR™
MORBIDITY AND MORTALITY
WEEKLY REPORT

Update: Outbreak of Acute Febrile Illness Among Athletes Participating in Eco-Challenge-Sabah 2000 — Borneo, Malaysia, 2000

During September 7–11, 2000, CDC was notified by the Idaho Department of Health, the Los Angeles County Department of Health Services, and the GeoSentinel Global Surveillance Network of at least 20 cases of acute febrile illness in three countries; all ill patients had participated in the Eco-Challenge-Sabah 2000 multisport expedition race in Borneo, Malaysia, during August 21–September 3, 2000 (*1*). Participants included athletes from 29 U.S. states and 26 countries. This report updates the ongoing investigation of this outbreak through December 2, which suggests that *Leptospira* were the cause of illness and that water from the Segama River was the primary source of infection. Participants in adventure sports and exotic tourism should be aware of potential exposure to unusual and emerging infectious agents.

MMWR Weekly
January 7, 2005 / 53(51 & 52);1195-1198

Transmission of Malaria in Resort Areas --- Dominican Republic, 2004

Malaria is caused by any of four *Plasmodium* parasites carried by *Anopheles* mosquitoes and usually is transmitted by the bite of an infective female *Anopheles*. In rural areas of the Dominican Republic, *P. falciparum* malaria is endemic, with the highest risk in the far western region of the country, and prophylactic medication with chloroquine is recommended for incoming travelers. Conversely, urban and resort areas in the Dominican Republic have been considered nonmalarious, and prophylactic medication has not been recommended for persons traveling to these areas (*1*). However, since November 2004, CDC has received reports of three malaria cases in U.S. travelers returning from areas in La Altagracia and Duarte provinces (Figure) previously considered nonmalarious. An additional 14 cases of malaria in La Altagracia Province, in the far eastern region of the country, have been reported in European and Canadian travelers. This report describes three of these 17 malaria cases and summarizes the overall investigation, which led to expansion of CDC recommendations for chloroquine prophylaxis to include all of La Altagracia and Duarte provinces.

Reported by: *C Kay, MD, D Patrick, MD, British Columbia Centre for Disease Control, Vancouver; J Keystone, MD, Univ Health Network/ GeoSentinel, Toronto; M Bodie-Collins, Public Health Agency of Canada. C Riera, MD, Pan American Health Organization; J Puello, MD, Ministry of Health, Dominican Republic. T Jelinek, MD, Berlin Institute of Tropical Medicine, Germany. D Freedman, MD, GeoSentinel Global Surveillance Network of the International Society of Travel Medicine, Stone Mountain, Georgia. P Kozarsky, MD, C Reed, MD, Div of Global Migration and Quarantine; M Parise, MD, P Nguyen Dinh, MD, R Steketee, MD, Div of Parasitic Diseases, National Center for Infectious Diseases; M Eliades, MD, EIS Officer, CDC.*

* The first U.S. patient was reported through the Emerging Infections Network, a provider-based sentinel network developed by the Infectious Disease Society of America. The other two U.S. patients were reported through the CDC Malaria Hotline. The Public Health Agency of Canada, the GeoSentinel Network, and the European Network on Imported Infectious Disease Surveillance reported six cases in travelers from Canada and eight cases in travelers from Europe.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

◄ Previous Volume 354:119-130 January 12, 2006 Number 2 Next ►

Spectrum of Disease and Relation to Place of Exposure among Ill Returned Travelers

David O. Freedman, M.D., Leisa H. Weld, Ph.D., Phyllis E. Kozarsky, M.D., Tamara Fisk, M.D., Rachel Robins, M.D., Frank von Sonnenburg, M.D., Jay S. Keystone, M.D., Prativa Pandey, M.D., Martin S. Cetron, M.D., for the GeoSentinel Surveillance Network

ABSTRACT

Background Approximately 8 percent of travelers to the developing world require medical care during or after travel. Current understanding of morbidity profiles among ill returned travelers is based on limited data from the 1980s.

Methods Thirty GeoSentinel sites, which are specialized travel or tropical-medicine clinics on six continents, contributed clinician-based sentinel surveillance data for 17,353 ill returned travelers. We compared the frequency of occurrence of each diagnosis among travelers returning from six developing regions of the world.

THIS ARTICLE

- Abstract
- PDF
- PDA Full Text
- PowerPoint Slide Set
- CME Exam
- Supplementary Material
- Translated Abstracts

COMMENTARY

- Perspective

TRAVEL NOTICE DEFINITIONS

CDC issues different types of notices for international travelers. As of April 2004, these definitions have been refined to make the announcements more easily understood by travelers, health-care providers, and the general public. The definitions are laid out below. They describe both levels of risk for the traveler and recommended preventive measures to take at each level of risk.

Type of Notice/ Level of Concern	Scope*	Risk for Travelers†	Preventive Measures
In the News	Reports of sporadic cases	No increased risk over baseline for travelers observing standard recommendations	Keeping travelers informed and reinforcing standard prevention recommendations
Outbreak Notice	Outbreak in limited geographic area or setting	Increased but definable and limited to specific settings	Reminders about standard and enhanced recommendations for the region
Travel Health Precaution	Outbreak of greater scope affecting a larger geographic area	Increased in some settings, along with risk for spread to other areas	Specific precautions to reduce risk during the stay, and what to do before and after travel‡
Travel Health Warning	Evidence that outbreak is expanding outside the area or populations initially affected	Increased because of evidence of transmission outside defined settings and/or inadequate containment measures	In addition to the specific precautions cited above, **postpone nonessential travel**‡

*The term "scope" incorporates the size, magnitude, and rapidity of spread of an outbreak.

†Risk for travelers is dependent on patterns of transmission, as well as severity of illness.

‡Preventive measures other than the standard advice for the region may be recommended depending on the circumstances (e.g., travelers may be requested to monitor their health for a certain period after their return, or arriving passengers may be screened at ports of entry).

Immigrant & Refugee Health
U.S. Arrivals, 2005

• All arrivals	175,400,000
• Unique individuals	~60,000,000
– **Short-term visitors**	**54,000,000**
– **Long-term visitors (> 2 mo stay)**	**3,000,000**
– **Immigrants**	**1,120,000**
new admissions	**380,000**
status-adjusters	**740,000**
– **Refugees**	**50,000**

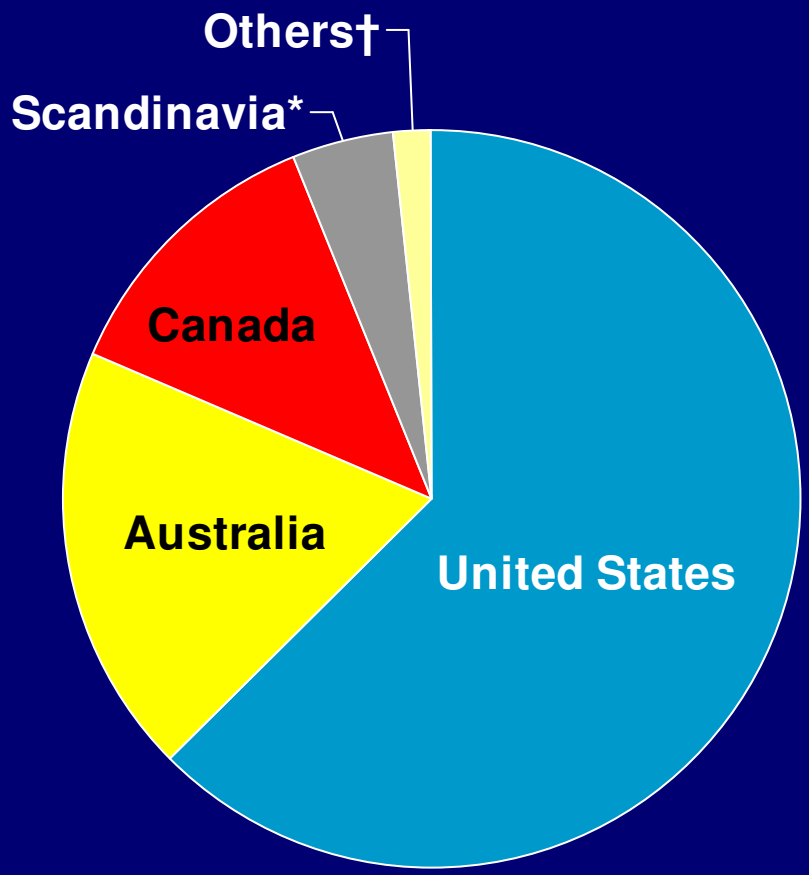
Immigrants: 2 Categories

- New arrivals
  - Immigration visa from overseas consulate
  - Numbers:
    - ~ 350,000 immigrants per year
  - Medical exam by overseas "panel physicians"
    - appointed by consulates
    - "technical instructions" by CDC
- "Status adjusters"
  - Persons in U.S. on non-immigrant visa applying for legal permanent residence ("Green Card")
  - Number: 450,000 to 750,000 per year
  - Medical exam by U.S.-based "civil surgeons"

"Durable Solutions" for Refugees
(8,500,000 in 2005)

- 3 UNHCR recognized durable solutions
  - Voluntary repatriation
    - *1,100,000 in 2005*
  - Local integration
    - *70,000 in 2005*
  - 3rd-country resettlement
    - *80,000 in 2005*

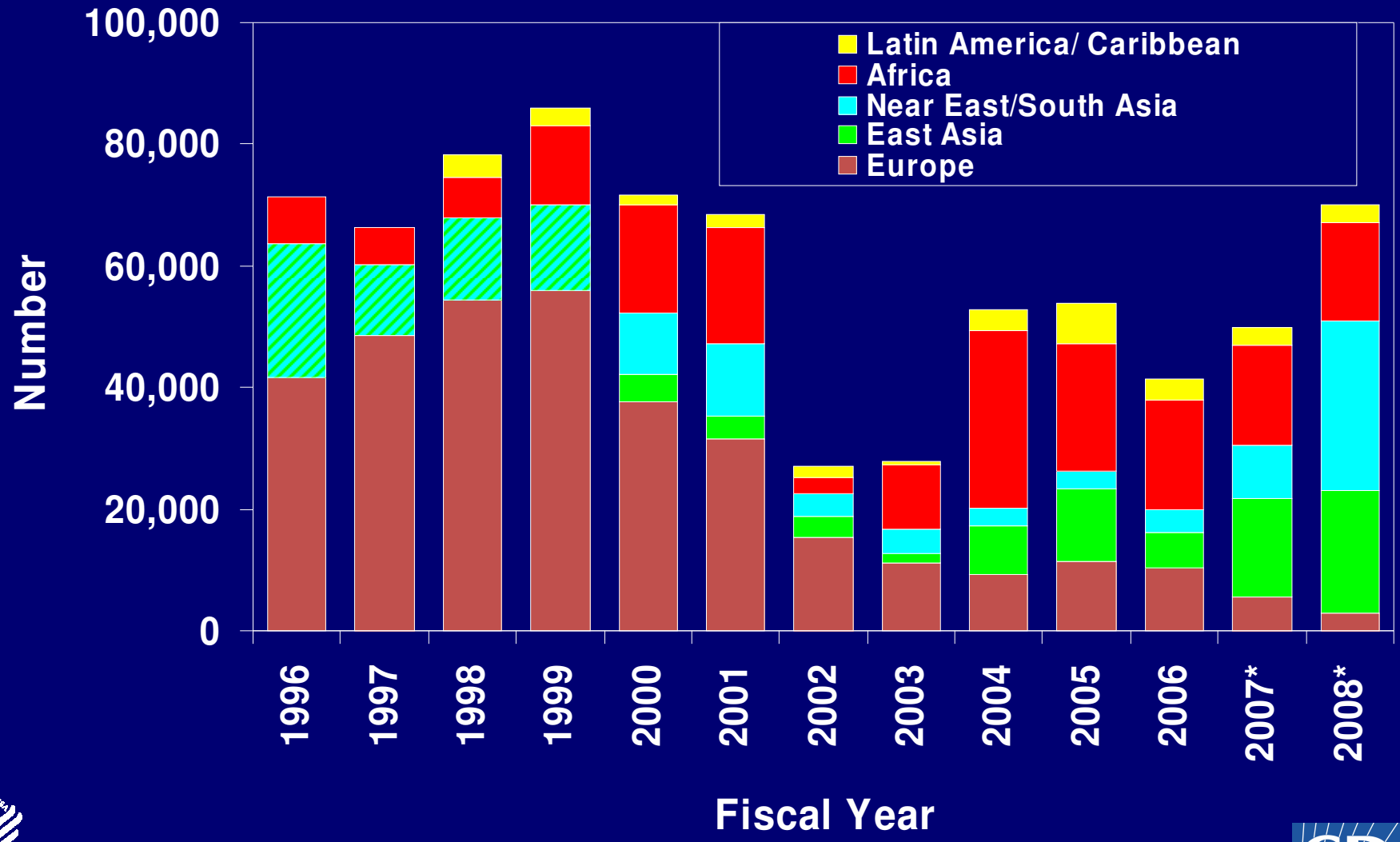
Refugee Resettlement, 2004 Admitting Countries



* - Sweden, Norway, Denmark, Finland

† - Netherlands, UK, New Zealand, Ireland, Chile, Mexico

U.S. Refugee Admissions 1996-2008



Source: U.S. Dept. of State

* Projected or proposed

Overview: Overseas Medical Assessment

- Focus: "inadmissible conditions"
- Components
  - **Medical history**
    - **Note: history is often unreliable among this population**
  - **Immunization history**
    - **Immigrants: at least 1 dose of ACIP-recommended vaccines**
    - **Exemption: international adoptees**
  - **Physical exam**
  - **Serologic tests: syphilis, HIV**
  - **TB screening**

Inadmissible Conditions

☐ **Class A Conditions** *(From Past Medical History and Physical Examination Worksheets)*

- ☐ TB, active, infectious *(Class A, from Chest X-Ray Worksheet)*
- ☐ Syphilis, untreated
- ☐ Chancroid, untreated
- ☐ Gonorrhea, untreated
- ☐ Granuloma inguinale, untreated
- ☐ Lymphogranuloma venereum, untreated
- ☐ Human immunodeficiency virus (HIV)
- ☐ Hansen's disease, lepromatous or multibacillary
- ☐ Addiction or abuse of specific* substance without harmful behavior
- ☐ Any physical or mental disorder *(including other substance-related disorder)* with harmful behavior or history of such behavior likely to recur

*amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids, phencyclidines, sedative-hypnotics, and anxiolytics

Class A: inadmissible without waiver

☐ **Class B Conditions** *(From Past Medical History and Physical Examination Worksheets)*

- ☐ TB, active, noninfectious *(Class B1, from Chest X-Ray Worksheet)*
  Treatment: ☐ **None** ☐ **Partial** ☐ **Completed**
- ☐ TB, inactive *(Class B2, from Chest X-Ray Worksheet)*
  Treatment: ☐ **None** ☐ **Partial** ☐ **Completed**
  See Section #4 on page 2 for TB treatment details
- ☐ Syphilis (with residual deficit), treated within the last year
- ☐ Other sexually transmitted infections, treated within last year
- ☐ Current pregnancy, number of weeks pregnant _____
- ☐ Other *(specify or give details on checked conditions from worksheets)*
- ☐ Hansen's disease, prior treatment
- ☐ Hansen's disease, tuberculoid, borderline, or paucibacillary
- ☐ Sustained, full remission of addiction or abuse of specific* substances
- ☐ Any physical or mental disorder *(excluding addiction or abuse of specific* substance but including other substance-related disorder)* without harmful behavior or history of such behavior unlikely to recur

*amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids, phencyclidines, sedative-hypnotics, and anxiolytics

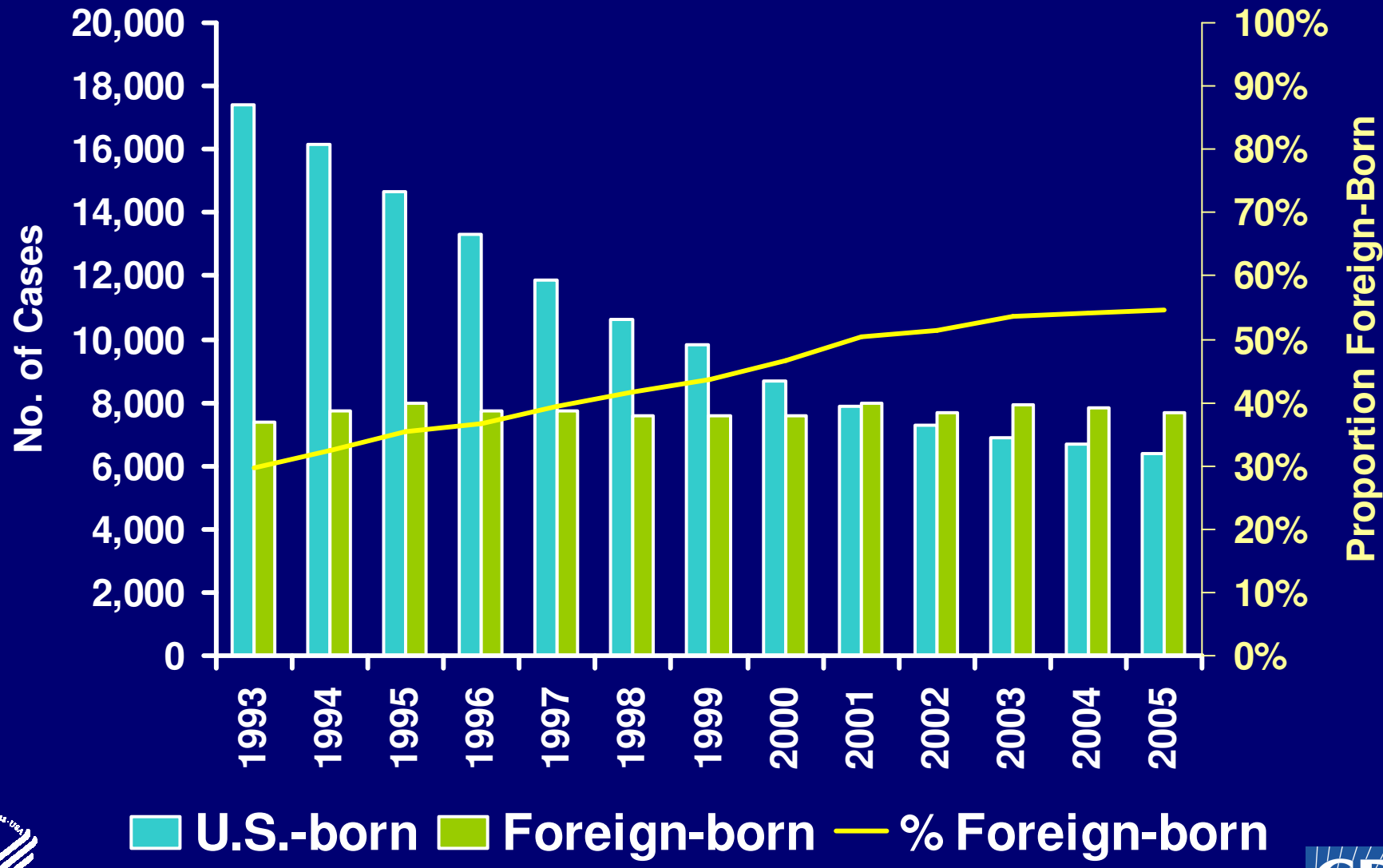
Class B: require notification

Source: Form DS 2053: "Medical Examination for Immigrant or Refugee Applicant"

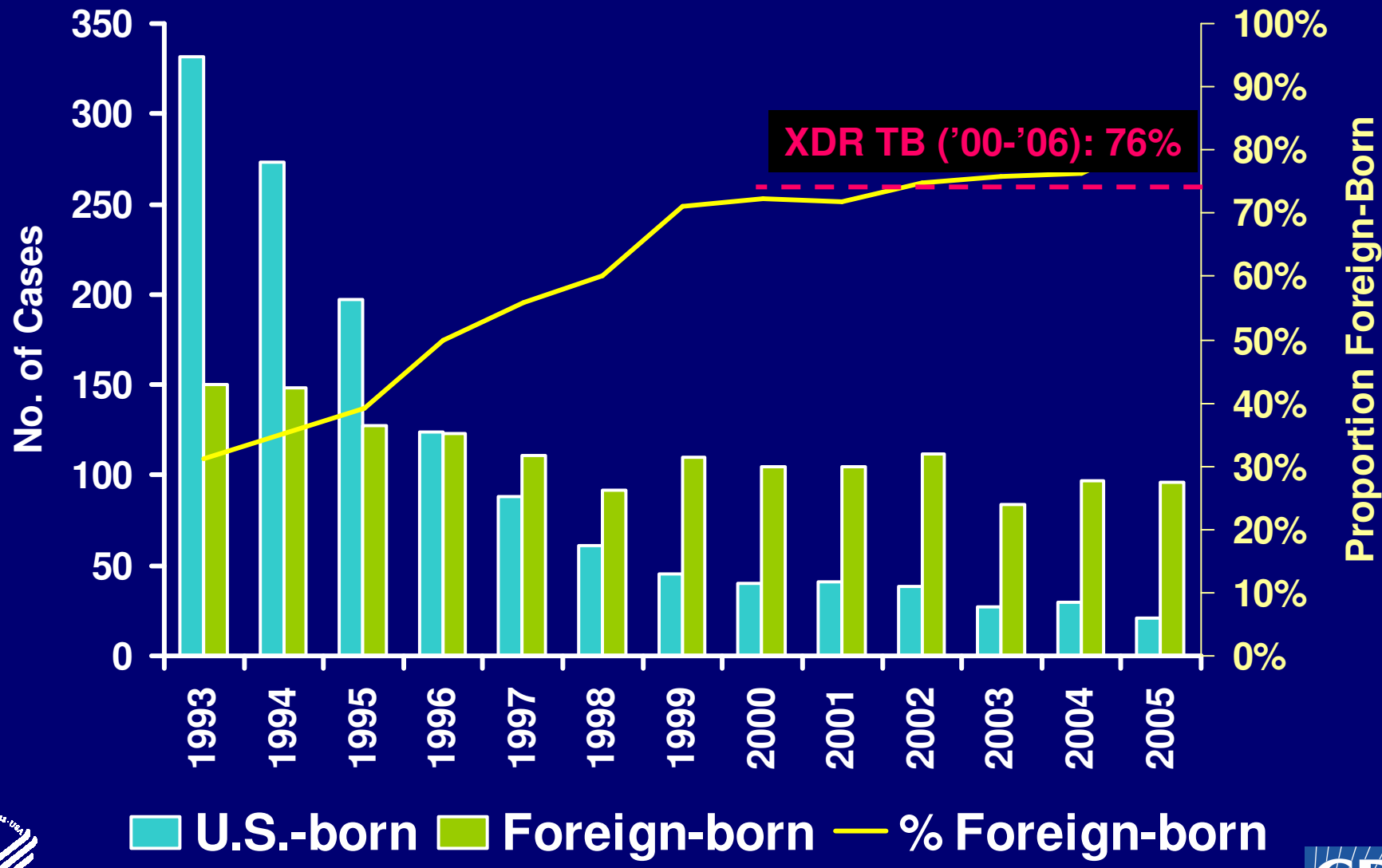
Overseas Medical Screening -- Weaknesses

- Current program
  - Regulatory approach rather than public health approach
  - Focus is “inadmissible conditions”, not improving health of the refugee
- Weaknesses:
  - TB screening and treatment under 1991 algorithm
  - No immunization requirement
    - Frequent outbreaks requiring costly interventions
    - Importation of VPD
  - Treatment of parasitic diseases
    - Single-dose albendazole
    - S/P for refugees from Sub-Saharan Africa
  - Prevention of perinatal HIV & HBV

TB Cases, United States, 1993-2005



MDR TB Cases, United States, 1993-2005



1991 Tuberculosis Screening Algorithm ("Technical Instructions")

- Chest X-ray (CXR) if ≥ 15 years old
- Sputum smears if signs, symptoms or CXR suggestive of TB
- No cultures, no drug susceptibility testing
- No treatment standards

2007 TB Technical Instructions

- Diagnosis
  - Sputum cultures for anyone with suspected TB
  - Drug susceptibility testing
  - Tuberculin skin test for children, with CXR if positive
- Treatment
  - Treatment to completion by directly observed therapy
  - Consistent with U.S. treatment standards (CDC/ATS, Curry Center)
- Implementation:
  - Over 5 years
  - 1st countries:
    - Immigrants: Mexico, Philippines, Vietnam
    - Refugees: Thailand, Malaysia, Nepal

Outbreaks of Vaccine-Preventable Diseases During Resettlement

- Measles – Kenya: 2004, 2005, 2007
- Mumps – Ethiopia: 2007
- Rubella – Cote d'Ivoire: 2004
- Varicella – Cote d'Ivoire: 2004; Thailand: 2004, 2006; Kenya: 2005
- Hepatitis A – Thailand: 2004
- Polio – Kenya: 2006
- Typhoid fever – Thailand: 2007

Rationale for Providing Vaccines Overseas

- Fewer outbreaks during resettlement
- Lower costs
  - Vaccines less expensive
  - Labor less expensive
- Fewer immunization visits post-arrival

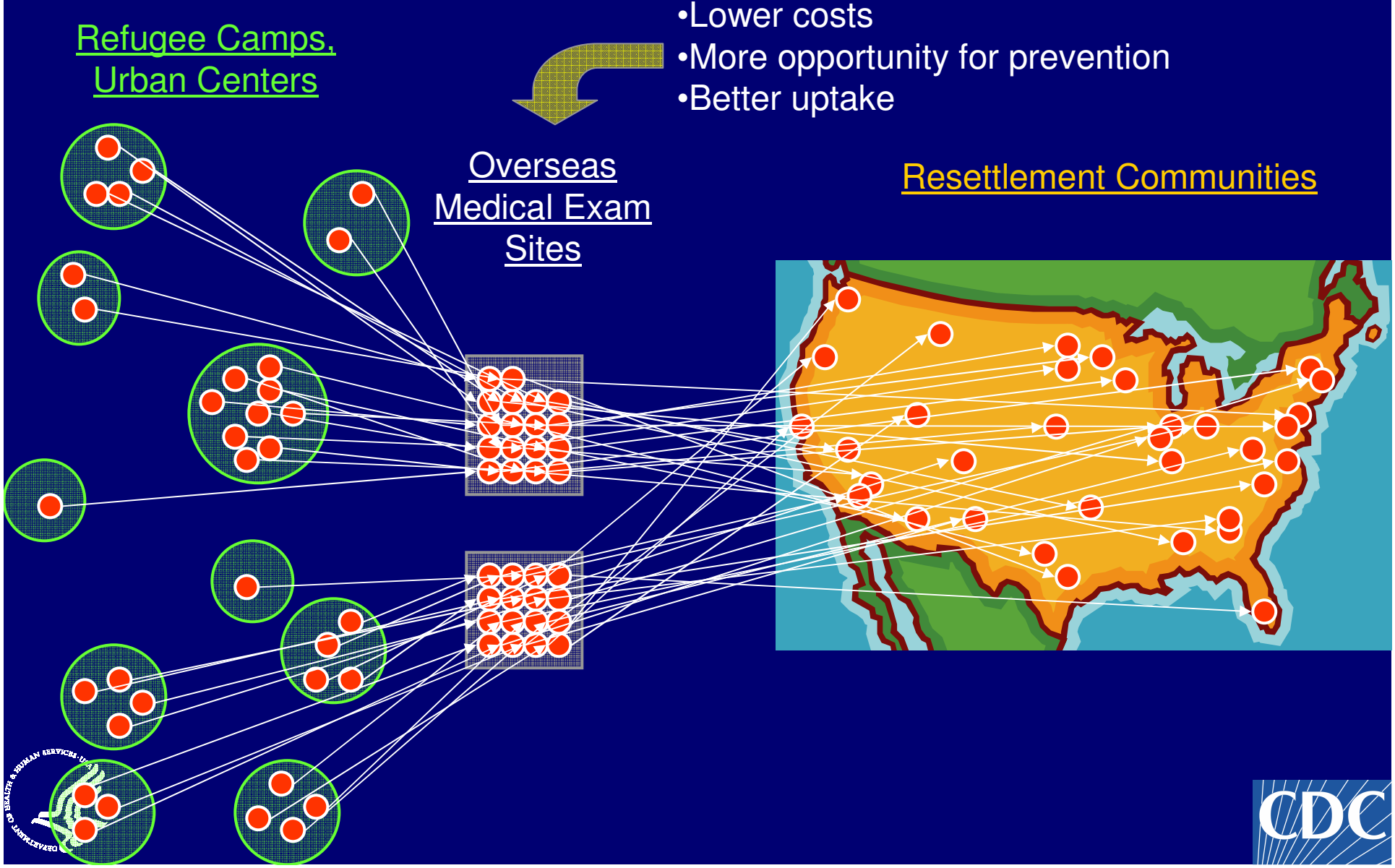
Rationale for Overseas Program

Refugee Camps, Urban Centers

- Lower costs
- More opportunity for prevention
- Better uptake

Overseas Medical Exam Sites

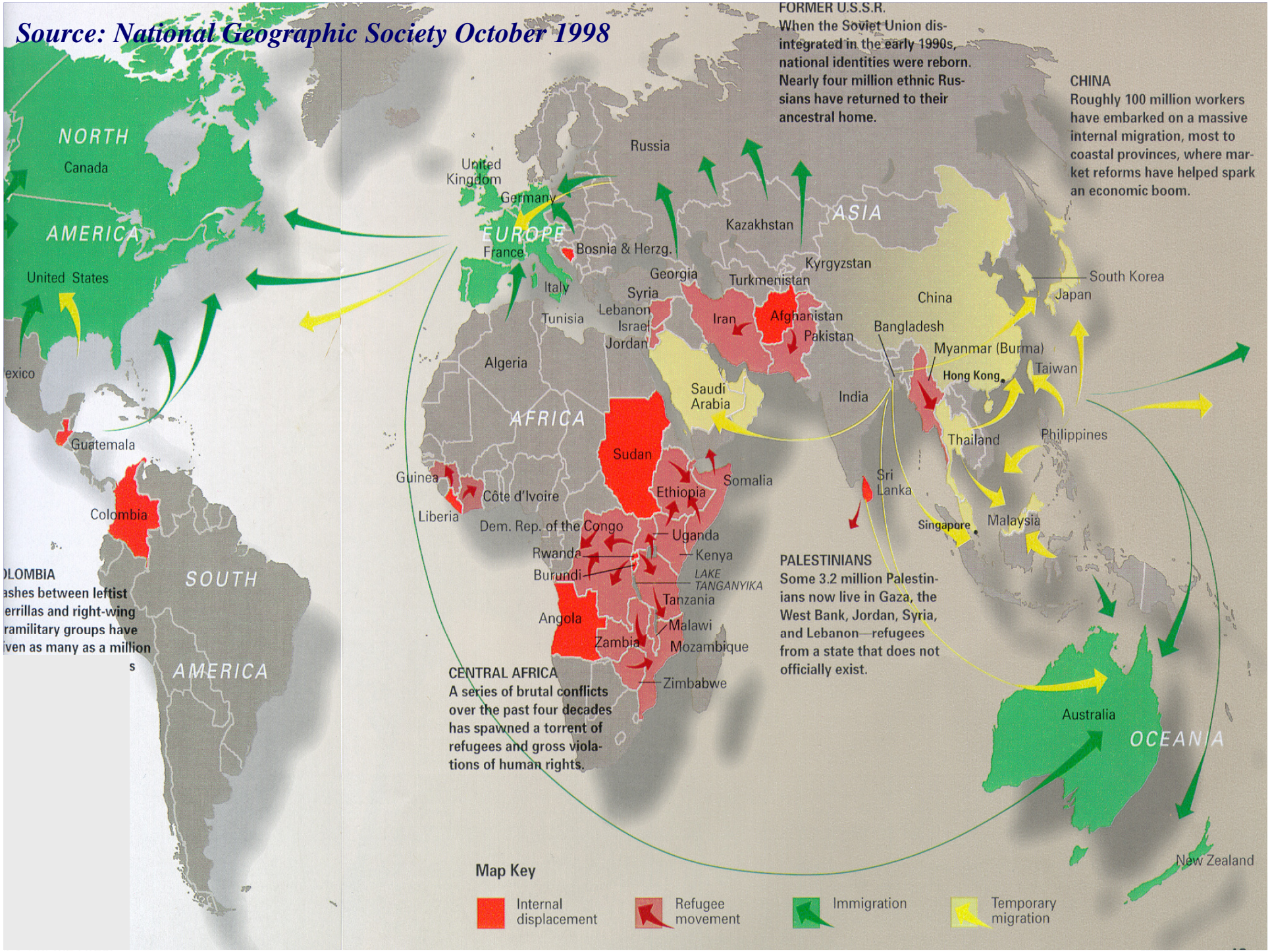
Resettlement Communities



Refugee Health Initiative

- Improved TB screening with revised “Technical Instructions”
- Future priority: latent TB
- Immunization
- Presumptive treatment of malaria, intestinal parasites, schistosomiasis
- Improved prevention of perinatally transmitted
  - HIV
  - HBV
- Surveillance

Source: National Geographic Society October 1998



Acknowledgements

- CDC
  - Gregory Armstrong MD
  - Gary Brunette MD
  - Phyllis Kozarsky MD
  - Christie Reed MD
- University of Alabama Birmingham
  - David Freedman MD

Visit CDC's Travelers Health Website
www.cdc.gov/travel

SAVE THE DATE!
CDC's 6th International Conference on Emerging Infectious Diseases
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